

REMARKS

Reconsideration of this application, as presently amended, is respectfully requested. Claims 1-19 are pending in this application. Claims 1-3, 6-8, 11-13, 16 and 17 stand rejected. Claims 4, 5, 9, 10, 14, 15, 18 and 19 were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The rejections set forth in the Office Action are respectfully traversed below.

Claim Rejections-35 U.S.C. §103

Claims 1-3, 6-8, 11, 12, 13, 16 and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over Prior Art Figs. 5-7 in the present application in view of **Platt** (US Patent Publication No. 2003/0200803). For the reasons set forth in detail below, this rejection, to the extent it is considered to apply to the presently amended claims, is respectfully traversed.

Claims 1, 6, 11 and 16 have been amended to clarify that an *input signal* to one of the pair of pulse signal generators (e.g., comparators 81, 82) is phase shifted (e.g., by phase shifter 21) to produce an output of one of the pair pulse generators that is phase shifted with respect to an output of the other of the pair of pulse generators. Support for this change is provided, e.g., on page 31, lines 18-26 of the present specification.

The present invention is directed to a system for driving and controlling the motors of a conveyance robot that conveys cartridges within a library apparatus, and, more particularly, to a system for controlling the operations of at least two system motors by pulse-width modulation

(PWM). Conventional systems for controlling the operation of two system motors by pulse width modulation suffer from the drawback that one of the two motors will finish operation earlier and wait for the other motor to finish operation, which is an inefficient state. In accordance with the present invention, the consumption efficiency of the power supply is increased and the load is reduced, without sacrificing conveyance time, by controlling to system motors so that they end at the same time.

The Examiner relies on related art Figs. 5-7 to teach a **motor controller** having a *pair of switches* and a *pair of pulse signal generators*. The Examiner recognizes that Figs. 5-7 do not disclose the claimed *inversion means*. See Office Action, page 2, Item 2, lines 1-12. A brief discussion of Figs. 5-7 is provided below.

Fig. 5 illustrates an access mechanism in a typical library apparatus. The access mechanism includes a hand mechanism 110, a horizontal moving mechanism 120 and a vertical moving mechanism 130 to convey a cartridge 200 within the library apparatus. The horizontal moving mechanism 120 and a vertical moving mechanism 130 are equipped with two system motors 51 and 52 (see Fig. 6), which are driven by pulse width modulation.

As shown in Fig. 6, the two system DC motors 51, 52 are connected in parallel with the power supply of a power supply module 70. The two system DC motors 51, 52 are also connected in series with switches 61, 62, respectively, so that the motors 51, 52 are driven by PWM. PWM signals from a conventional PWM-signal generation circuit 80 (Fig. 7) are supplied to the switches 61, 62 to turn ON or OFF the pair of switches 61, 62.

As shown in Fig. 7, the conventional PWM-signal generation circuit 80 includes a first PWM signal generator 81 to generate PWM signals for switch 61 and a second PWM signal generator 82 to generate PWM signals for switch 62. As shown in Fig. 8, and described on page 4, line 19 – page 5, lines 5 of the present specification, the PWM signals have predetermined duty ratios and at a predetermined cycles.

Thus, Figs. 5-7 generally disclose a motor controller having a pair of switches and a pair of pulse signal generators.

The Examiner relies on the **Platt** reference to teach an inversion means for inverting, with respect to a phase of one of said two pulse signals that is generated and output by one of said two pulse signal generators, a phase of the other of said two pulse signals, which is generated and output by the other of said two pulse signal generators, by 180 degrees, previously recited in the claims.

Platt discloses drive electronics for producing a pulse width modulation drive signal for improved performance of a microelectromechanical systems (MEMS) gyroscope. Fig. 2 illustrates the drive electronics 200 for use with the gyroscope 100. The drive electronics include an input signal unit 240 that is operable to provide an input signal 250, such as a triangle waveform (see section [0028]). A PWM signal unit 260 compares a DC threshold level 230 with the input signal 250 to generate a PWM drive signal 270 (see section [0030]).

The PWM signal unit 260 may provide two PWM drive signals that are 180 degrees out of phase. **Platt** also discloses that the drive electronics may include a phase shifter that is

operable to convert the PWM drive signal 270 into two PWM drive signals that are out of phase (see section [0032]).

However, **Platt** does not disclose or suggest inversion means for inverting a phase of an input signal to one of said pair of pulse generators, such that a phase of one of said pair of pulse signals that is generated and output by one of said pair of pulse signal generators is phase shifted by 180 degrees with respect to a phase of a pulse signal generated and output by the other of said pair of pulse signal generators, as currently recited in independent claims 1, 6, 11 and 16.

Unlike the claimed invention, **Platt** teaches that the PWM signal unit 260, which outputs the PWM drive signal 270, may provide two PWM drive signals that are 180 degrees out of phase. However, **Platt** does not disclose or suggest that an *input signal* to the PWM signal unit 260, which is a comparator, is phase shifted to produce two output PWM signals that are phase shifted with respect to each other.

Therefore, it is respectfully submitted that the combination of related art Figs. 5-7 and the **Platt** reference does not result in the presently claimed invention. Reconsideration and withdrawal of the rejection under 103 is respectfully requested for at least the reasons set forth above.

Further, it is respectfully submitted that there is no incentive or motivation to combine the references (i.e., Figs. 5-7 and **Platt**) and therefore the Examiner has not established a *prima facie* case of obviousness under §103.

More particularly, Figs. 5-7 of the present application disclose a *digital* counter 83 that outputs a count value that is compared with a duty set value (i.e., a digital value) to generate a

PWM drive signal. Thus, Figs. 5-7 relate to a digital system. However, **Platt** discloses a system that compares a DC threshold level 230 with an input signal 250, such as a triangle wave, to generate a PWM drive signal. Thus, **Platt** relates to an analog system.

Further, Figs. 5-7 generate respective PWM signals to drive *two system motors*. **Platt** discloses generating two PWM signals for motor drive combs 170, 172 of *the same motor*.

Finally, the only incentive offered by the Examiner for combining the **Platt** with Figs. 5-7 is “for improved performance” (see Office Action, page 2, last line). However, none of the cited references disclose or suggest that improved performance would result by inverting the phase of PWM signals to two separate system motors, as presently claimed. The only reference that discloses or suggests such improved performance is applicant’s own teachings.

Therefore, it is respectfully submitted that there is no motivation or incentive to combine the references, and that the Examiner has used improper hindsight to reconstruct the claimed invention based on applicant’s teachings. Accordingly, the rejection under §103 is improper and should be withdrawn for this additional reason.

CONCLUSION

In view of the foregoing amendments and accompanying remarks, it is submitted that all pending claims are in condition for allowance. A prompt and favorable reconsideration of the rejection and an indication of allowability of all pending claims are earnestly solicited.

Application No. 10/827,425
Art Unit: 2837

Amendment under 37 C.F.R. §1.111
Attorney Docket No.: 042331

If the Examiner believes that there are issues remaining to be resolved in this application, the Examiner is invited to contact the undersigned attorney at the telephone number indicated below to arrange for an interview to expedite and complete prosecution of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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